
THE EFFECTIVENESS OF INQUIRY LEARNING MODEL WITHIN NATURE AS MEDIA ON NATURAL SCIENCE SCORE FOR 5TH GRADERS OF ELEMENTARY SCHOOL

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Abstract. Scores of Natural Science (IPA) subject achieved by 5th graders are generally still low. It needs such innovations in learning to improve the score. *Inquiry* model within nature as media was used as finding-based learning model so that students had such kind of real experience and additional knowledge to find solutions for the existing problems. This research aimed to determine the effectiveness of inquiry model within nature as media on Natural Science subject scores in “force” theme for 5th graders of SD Negeri Beji 03. The selected research method was experiment research. The collected data was analyzed for hypothesis tests; mean/average test (t-test), proportion test, mean/average difference test on Natural Science scores. Result of the processed data analysis concluded that: (1) Scores of Natural Science subject by students of experimental class reached individual learning mastery ≥ 65 by score of $t_{\text{value}} \geq t_{\text{table}}$ as $6,6023 \geq 1,6909$ with $df = n-1$ and significance level of 5%; and also reached classical learning mastery $\geq 75\%$ by score of $Z_{\text{value}} > -Z_{\text{table}}$ as $2,692 > -1,64$ with $Z_{\text{table}} (\frac{1}{2} - \alpha)$; (2) Natural Science scores using *Inquiry* model within nature as media was more effective than those using expository model. It was proven by t-tests on both sides with criteria: H_0 was accepted if $-t_{\text{table}} \leq t_{\text{value}} \leq t_{\text{table}}$ while the value of $t_{\text{value}} = 2,931$ was on H_0 rejection as $-1,9969 \leq t_{\text{value}} \leq 1,9969$ so the H_0 was rejected, with significance level of 5% and $df = n_1 + n_2 - 2$. Based on the result of processed data analysis, it was concluded that *Inquiry* model within nature as media was effective on Natural Science scores in theme of “force” for 5th graders in SD Negeri Beji 03.

INTRODUCTION

Education is often interpreted as human effort to build personality based on values in society and culture. As Dewey (Hasbullah, 2015:2) explained, that education is a process of building fundamental skills intellectually and emotionally between nature and fellow human beings. Thus, in order to keep up to the speedy advance of age, education realm is required to be able to improve and accomplish education quality, especially on Natural Science (IPA) subject.

Natural Science should be conducted well in learning process at school. Natural Science learning is said to be successful if all of learning achievements are acquired, revealed in score achievement by students. However, the fact was that some schools still had low scores in Natural Science subject as mastery standard was not accomplished.

Natural Science studies about universe, things on earth, inside of earth and outer space, observable or not observable things by senses. (Trianto, 2015: 136). Natural Science in elementary schools contains lessons about

knowledge of nature closely related to students daily life. The students hopefully could recognize and understand the knowledge of nature in their daily life.

Natural science is very important as it is examined in National Examination, and moreover, its knowledge could be used in society. According to Aly and Rahman (Afandi, 2015: 16), Natural Science is a theoretical knowledge acquired/compiled with typical steps, as experimental observation, drawing conclusion, compiling theories, experimentation, observation and so on related to each other.

Purpose of Natural Science learning, referring to Permendiknas (Minister of National Education Regulation) No. 22, 2006 about content standard for education units, was that Natural Science was expected to become a tool for students to learn their selves and nature around, and also a prospective further development for daily implementation.

Natural Science (NS) is needed in daily life to fulfil human needs by solving identified

problems. Implementation of Natural Science should be conducted wisely in order to prevent bad effects on environment. NS learning should emphasize the improvement of thinking skill, working, scientific attitude and also communicate it as an important aspect in life skills.

Problems faced in elementary schools when having NS learning is that the usage of media or teaching aid is not yet optimal even the school has it, minimum involvement of students in experiments that led to the lack of skill, and lack of variation in learning model. Purpose of applied learning tends to require students to be skillful in answering test questions, in both handbook or test questions. Consequently, students' concept comprehension is still low, skills in scientific process and attitude do not develop. It leads to a situation in which students passively follow a lesson and have lack of bravery to ask. Factors explained before show that learning processes are conducted in class conventionally. The materials are delivered by speech method. Students could just listen and pay attention on the teacher's explanation.

This problem should be solved soon. The alternative way is by using a learning model that could accommodate a solution to this problem, that is, inquiry model within nature as media. Inquiry model is a model that emphasizes on critical and analytical thinking process to find the answer for the given questions (Hosan, 2014: 341). It is supported by Damayanti (2014: 2) that inquiry model is a process to collect information by conducting observation to find the answer or solve the problems contained in the questions by using critical and logical thinking ability. Furthermore, NS learning in Elementary School emphasizes on directly given experience through the usage and development on process skill and scientific attitude.

METHOD

This research was an experimental research. Design used in this research was True Experimental Design. The author used the form of *Only Control Design* Post-test, which was part of *True Eksperimental Design*. The first group was given a treatment (X) while the other was not. The group which received the treatment was called as experiment group while the other was called as control group. The control group was given an expository learning model, while the experiment group was given an inquiry learning model within nature as media.

Population in this research was 5th graders in SD Negeri Beji 03 (36 students) and SDN Beji 01 (36 students). Selection of samples used *Probability Sampling* and *Simple Random Sampling* techniques. According to Sugiyono (2013: 120) *Simple Random Sampling* is said simple since

Using inquiry model would have students to have concrete experience so they can learn to build their own knowledge, develop critical thinking skill and to be motivated to involve. Empowering nature as learning media to have interesting, joyful and suitable learning for students. According to Jiwaningrumdan Suryono (2014: 3) nature based learning is an education activity (school or curriculum) that should be able to help students develop their potential development used to creatively adapt within nature. Learning activity within nature will help students to elaborate and explore nature as learning media and stimulate their cognitive development based on the development stages. Learning process that empowers nature as a learning resource basically could develop thinking ability about a concept or activity they learn.

Besides, students also involve in various activities that develop their understanding and ability by emphasizing on practice learning. By using nature as media, students would easily understand the materials delivered by the teacher by having them sightseeing, observing around, and then thinking about the problems and recording their findings.

Using inquiry model by empowering nature as media would create more interesting and acceptable NS learning so that the students would be more enthusiastic and encouraged to have a learning from the teacher. From previous explanation, the author stated 2 problems:

1. Could the scores gained in Natural Science subject using inquiry model within nature as media reach the level of learning mastery for 5th graders in SDN Beji 03?
2. Is Natural Science lesson using inquiry learning model more effective than of using expository learning model on theme "force" for 5th graders in SDN Beji 03?

its member selection is conducted randomly without considering strata in the population. This way is done if the population are considered as homogene.

Techniques used to collect data in this research were tests, observation and documentation. Before the test was given to the sample class, the question items were given as trials first. The trial was conducted to determine the difficulty level of the items, discriminating power of the items, validity of the items, and reliability of the items. The test was aimed to collect quantitative data and the result would be calculated to test the hypothesis validity. The observation conducted was a direct observation. This research used observation sheets to collect data about student's activity during the lesson/learning. The observation sheets were filled in by using scale 1 to 4. Documentation in

this research was conducted to collect data of names and number of students who would become the samples of the research.

Data analysis technique used in experimental research was statistical calculation. The analysis on the raw data was to determine the initial condition of samples. The analyzed data was collected from daily exam scores of NS on theme “force” in second semester. The data of scores was collected from two classes provided by the research samples. Analysis on this data of scores included normality test, homogeneity test, and two

RESULT AND DISCUSSION

This research had been conducted in SD NegeriBeji 03 from the beginning to the end. Raw data of students was gained from daily exam scores of Natural Science (NS) subject on theme “force” in second semester. The raw data was used to

means/averages similarity test.

The processed data that would be analyzed in this research was in forms of test scores and result of observation on students’ activity. Analysis on the processed data was conducted to test the hypothesis. After both samples received different treatments, they received final test to collect data needed in this research. Then, analysis on the processed data was applied including normality test, homogeneity test, mean test, classical learning mastery proportion test, and mean difference test.

determine normal distributive data, both classes had homogenic (relatively similar) initial ability and similar average scores of each sample class. Description of the raw data is presented on the following table.

Display of Raw Data of Experiment and Control Class

No	Criteria of Data	Raw Data of Students	
		Experiment	Control
1	Number of students	36	36
2	Mean Score	65,3	66,7
3	Standard deviation	10,7	11,8
4	Variance	114,4	141,0
5	Range	34	43
5	Minimum Score	50	50
6	Maximum Score	84	93

Processed/final data came from test score of students obtained and would be processed for testing hypothesis about NS learning scores by

students of experiment and control classes after receiving treatments. The data of students’ scores is displayed in details on the following table.

Display of Processed Data of Experiment and Control Class

No	Criteria of Data	Processed Data of Students	
		Experiment	Control
1	Number of students	36	36
2	Mean Score	80.1	70.0
3	Standard Deviation	13.7	15.4
4	Variance	189.9	237.2
5	Range	54	55
5	Minimum Score	46	42
6	Maximum Score	100	97

Result of student activity scores was obtained based on the observation on student activity during the research, that was on first and second meeting in both experiment and control class. Observation on student activity was conducted by using observation sheets to measure affective aspects. The observation was done in

order to compare how much the effectiveness of learning model for studen activities. On experiment class was applied an inquiry model within nature as media, while the expository model was applied on control class. The following is a display of data of student observation result that had been recapitulated.

Data of Student Activity Observation During the Research

Class	Criteria n (36)	Indicator				Average (%)	Criteria
		A	B	C	D		
Experiment	Numbers	252	247	215	231	82.03%	Very good
	Average	3.50	3.43	2.99	3.21		
	Percentage	87,50 %	85,76%	74,65%	80,21%		
Control	Numbers	232	224	192	202	73.79%	Good
	Average	3.22	3.11	2.67	2.81		
	Percentage	80,56 %	77,78%	66,67%	70,14%		

Data of obtained research result was then analyzed to interpret the collected data and also to answer the research hypothesis. The following is the explanation of result of test instrument test, raw data and processed data of experiment and control class.

The measuring instrument that would be analyzed in instrument test was trial test, that was validity test, reliability test, discriminating power and difficulty level, so it would produce a set of question items that was eligible to be processed as research result. Calculation result of validity analysis resulted that the question number 2, 3, 4, 5, 7 and 8 was valid while the number 1 and 6 was not valid. Analysis on trial test obtained $r_{value} = 0.807$ $r_{productmoment}$ and r_{table} for $n = 32$ and 5%

of significance level was 0,349 because of $r_{value} > r_{table}$ so the question items were reliable to very high category. From a total of 6 question items that had been valid and tested, there were 4 items that were in good category, they were the question number 3,4,7,8. While 2 questions with fairly good category, they were the question number 2 and 5. Based on trial analysis, there were 2 items in easy category, they were the question number 2 and 6, and 4 items in medium category, they were the question number 3,4,7 and 8.

Analysis on raw data conducted in this research included tests of normality, homogeneity and 2 means similarity. The following is the description of analysis test result of experiment and control class raw data.

Raw Data Normality Test

No	Criteria of Data	Normality Test	
		Experiment	Control
1	Number of students	36	36
2	Mean Score	65,36	66,70
3	Standard Deviation	10,696	11,875
4	Lmax	0,103	0,126
5	Ltable (n-1)	0,1498	0,1498

The table above showed that initial ability of students in experiment and control class was

normal. Samples were obtained from normally distributed population.

Homogeneity Test of Raw Data

No	Criteria of Data	Homogeneity Test	
		Experiment	Control
1	Number of students	36	36
2	Mean Score	65,36	66,70
3	Standard Deviation	10,696	11,875
4	Variance	114,409	141,018
5	Fvalue	1,233	
6	Ftable	1,757	

The table above showed Fvalue =1,233 was smaller than Ftable1,757 so it could be concluded that data of initial ability in experiment and control class

showed no different variance between both classes or variance was homogeneity.

Test of Similarity between Two Means of Raw Data

No	Criteria of Data	Test of Similarity in Two Means	
		Experiment	Control
1	Number of Students	36	36
2	Mean Score	65,36	66,70
3	Standard Deviation	10,696	11,875
4	Variance	114,409	141,018
5	Scombined	11,236	
6	t value	-0,501	
7	t table	1,9969	

It was obtained t_{value} as -0.501 and t_{table} as 1.9969 with the result of $-t_{tabel} < t_{hitung} \leq t_{tabel}$ so H_0 was accepted with 5% significance level and $dk = n_1 + n_2 - 2$, because $-1.9969 < -0.501 \leq 1.9969$. It could be concluded that data of initial ability in experiment

and control class had No. difference between both classes.

The processed data was obtained from result of the test conducted after receiving a learning. Question items used in test result had passed stage of test instrument testing. Analysis on the processed data consisted of normality test, homogeneity test, and hypothesis test.

Normality Test on Processed Data

No	Criteria of Data	Normality Test	
		Experiment	Control
1	Number of Students	36	36
2	Mean Score	80,17	70,06
3	Standard Deviation	13,783	15,403
4	Lmax	0,0813	0,0886
5	Ltable (n-1)	0,1498	0,1498

It could be concluded that data of exam scores by students in experiment and control class

was normal, the samples were from normally distributed population.

Homogeneity Test on Processed Data

No	Criteria of Data	Homogeneity Test	
		Experiment	Control
1	Number of Students	36	36
2	Mean Score	80,17	70,06
3	Standard Deviation	13,783	15,403
4	Varians	189,971	237,254
5	Fvalue	1,249	
6	Ftable	1,757	

Based on the table, so the test criteria was if $F_{value} < F_{table}$ with $F_{table} = F_{\alpha}(dk_{large\ variance} - 1 / dk_{small\ variance} - 1)$ 5% significance level so H_0 was accepted (homogeneous variance). The result was that H_0 was accepted, because 1.249 was smaller than 1.757 so the conclusion was that there was no different variance in test scores between experiment and control class, or it was homogenic variance.

Test for means was used to test average score of individual learning mastery in experiment class that had received inquiry learning model within nature as media and fulfilled Minimum Mastery Criteria as 65 using one-sided t test, it was the right side. According to calculation of mean difference test, $t_{value} = 6.6023$ and $t_{table} = 1.6909$ with applicable criteria was that rejecting H_0 if $t_{value} \geq t_{table}$ in which t_{table} was obtained from standard normal distribution with 5%

significance level and $dk = n - 1$, because $6.6023 \geq 1.6909$ so H_0 was rejected and H_a was accepted. It means that, based on data of student test result in experiment class, mean score of test in experiment class using inquiry learning model within nature as media > 65 and had fulfilled Minimum Mastery Criteria.

Test of proportion on classical learning mastery used one-sided z test, to test the proportion of student learning score mastery that received inquiry learning model within nature media $> 75\%$. Based on the research result, there were 32 of total 36 students who were eligible. The applicable test criteria was that; H_0 was accepted if $Z_{value} > -Z_{table}$ in which Z_{table} obtained from standard normal distribution with probability of $(\frac{1}{2} - \alpha)$. In this condition, H_0 was rejected. Based on the calculation, value of $Z_{value} > -Z_{table}$ was $2.692 > -1.64$ so H_0 was accepted, meaning that proportion of Natural Science score learning mastery by students who received inquiry learning model within nature as media was as 75%. So, the students in experiment class classically had reached learning mastery.

Test on mean difference was conducted to prove that mean of scores by students using inquiry learning model within nature media was more effective than of which using expository learning model. Test on the effectiveness used two-sided t test. Based on test of two means comparison, value of $t_{value} = 2.931$ and $t_{table} = 1.9969$ with t_{table} ($dk = n_1 + n_2 - 2 = t_{0,05}$ ($dk = 36 + 36 - 1 = t_{0,05}$ (70) as 1.9969 from value of t_{table} to test two sides with applicable test criteria was that H_0 was accepted if $-t_{table} \leq t_{hitung} \leq t_{table}$ because value of $t_{value} = 2,931$ was on rejection area $Hoas -1,9969 \leq t_{value} \leq 1,9969$ so H_0 was rejected and H_a was accepted, and it could be concluded that in data of test in experiment and control class there was a difference between the two classes. It meant that mean of test scores using inquiry model within nature media was more effective than that using expository learning model.

Based on research data and data analysis, the effectiveness of inquiry learning model within nature as media in Natural Science subject on theme "force" for 5th graders in SD Negeri Beji 03 was said to be effective. Scores in Natural Science learning using inquiry model within nature as media had fulfilled learning mastery criteria, proven in one-side (right side) t test, by applicable

test criteria as H_0 was rejected if $t_{value} \geq t_{table}$ in which t_{table} was obtained from standard normal distribution with 5% significance level and $dk = n - 1$ as resulted $6.6023 \geq 1.6909$ so H_0 was rejected and H_a was accepted. It meant that mean of exam scores in experiment class using inquiry model within nature as media > 65 and had passed Minimum Mastery Criteria.

Test of z proportion with applicable test criteria was that if H_0 was accepted if $Z_{value} > -Z_{table}$ in which Z_{table} was obtained from standard normal distribution with probability $(\frac{1}{2} - \alpha)$. In other condition, H_0 was rejected, the result was that $Z_{value} > -Z_{table}$ as $2.692 > -1.64$ so H_0 was accepted and proportion of exam scores by students who received inquiry learning model within nature as media was more than 75%. Then, students in experiment class had reached classically the learning mastery as 32 students were eligible and 4 students were ineligible.

Result of this research strengthen the previous research conducted by Santiasih, Marhaeni and Tika (2013). In line with it, research conducted by Dewi, Dantes and Sadia (2013) reaffirmed that applying directed inquiry learning model was better than that using conventional learning model. Another research by Husain dan Ritman (2014) was also in line with this research, saying that inquiry learning model could improve learning result in Natural Science for 5th graders. Again, it was then in line with the research conducted by Widiana (2017).

Based on the result of the study on student exam scores as explained before, scores in Natural Science subject by students in class that applied inquiry learning model within nature as media could fulfilled learning mastery criteria and was more effective than the class that used expository learning model. In line with student activity showing that students activity in experiment class was more effective than in expository class. Furthermore, it could be concluded that inquiry model within nature as media was more effective on learning scores in Natural Science subject than the expository learning model applied in control class

CONCLUSIONS

Based on result of research about the effectiveness of inquiry learning model within nature as media in Natural Science scores on theme "force" for 5th graders in SD Negeri Beji 03, it could be concluded that it was said to be effective because:

1. Student exam scores when using inquiry learning model within nature as media on theme “force” had fulfilled learning mastery criteria.
2. Test scores by students using inquiry learning model was more effective than the scores obtained by students using expository learning model on theme “force”.

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